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INTERVENTIONS TO TREAT TENDINOPATHY - AN EVIDENCE BASED APPROACH?

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OUTLINE

- Brief introduction to tendinopathy
- Summary of literature of common Interventions
- Case discussions

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TENDINOPATHY

TENDINOPATHY

- Achilles
- Patellar
- Lateral elbow

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PATHOLOGY

Figure 1 Pathology continuum: the model advances the transition from normal tendon to degenerative tendinopathy and highlights the potential for reversibility early in the continuum. Reversibility of pathology is unlikely in the degenerative stage.

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PATHOLOGY

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PATHOLOGY

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TENDINOPATHY

What is causing the pain/ what's the pathology?

- Tendon tear
- Tendon split
- Tendon swelling
- Tendon neo-vessels/nerve
- Calcification
- Lay down of calcium
- Enthesophyte pinching
- Enthesophyte fracture
- Inflammation in tendon (rheumatological issue)
- Inflammation in paratenon
- Friction on the tendon
- Inflammation surrounding tendon (e.g bursae)
- Avulsion/traction acute/chronic

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TREATMENT

ISOMETRIC QUADRICEPS

ACHILLES TENDON PAIN

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TREATMENT



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INTERVENTIONS

- **Injections**
 - Platelet Rich Plasma
 - High volume injections
 - Hyaluronic acid
 - Steroid
- **Shockwave**

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BLOOD PRODUCTS

- **Injecting own blood**
 - Platelet rich plasma (PRP)
 - Autologous blood injections (ABI)

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PLATELET-RICH PLASMA INJECTION: THEORY

Platelets maintain tissue homeostasis

Platelets contain bioactive substances (TGF-Beta, PDGF and HGF) which play a vital role in tissue healing

PRP forms a fibrin gel around the tendon providing a bio scaffold for migrating cells – incorporates new cells for tendon healing

Acts to

- Induce cell proliferation of tenocytes and tendon stem cells
- Induce tenocyte differentiation
- Increase total collagen synthesis

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PRP



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PRP

PROCESS OF PRP THERAPY

- Collect blood**
30-40ml of blood is drawn from the patient's arm.
- Separate the platelets**
The blood is then placed in a centrifuge. The centrifuge spins and separates the platelets from the rest of the blood components.
- Extract platelet-rich plasma**
Extract 3-4ml of platelet-rich plasma.

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PRP

What does the evidence say?

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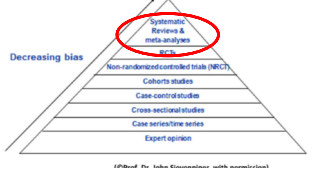
PRP

Platelet rich plasma

De Vos RJ, Weir A, Van Schie HT, et al.
Platelet-rich plasma injection for chronic Achilles tendinopathy: a randomized controlled trial. JAMA 2010;303:144-9.

Not effective compared to placebo

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PLATELET-RICH PLASMA INJECTION: PATELLAR TENDINOPATHY

Platelet-Rich Plasma Injections as a Treatment for Refractory Patellar Tendinosis: A Meta-Analysis of Randomized Trials.
Bosmans et al. Arthroscopy. 2017 Sep;33(9):1651-1671.
- 2 RCTs

CONCLUSION: Improved VISA-P at 6 months compared to CSWT & dry needling

Author	Study type	Intervention	Control	Outcome measures	Follow up
Boorman et al. 2017	Randomized controlled trial	PRP	CSWT	VISA-P, Lysholm, and SF-36	6 months
Boorman et al. 2017	Randomized controlled trial	PRP	Dry needling	VISA-P, Lysholm, and SF-36	6 months

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PLATELET-RICH PLASMA INJECTION

Efficacy of platelet-rich plasma injections for symptomatic tendinopathy: systematic review and meta-analysis of randomised injection-controlled trials.
Miller et al...

- Level 1 evidence
- Lateral epicondylar tendinopathy – 12 studies
- PF: 1 study
- RC: 3 studies
- AT: 2 studies
- PRP more efficacious than control for symptom relief
- Probably works better longer term

PRP

The Efficacy of Platelet-Rich Plasma on Tendon and Ligament Healing: A Systematic Review and Meta-analysis With Bias Assessment.
Chen et al. Am J Sports Med. 2018 Jul;46(8):2020-2032.
May improve pain with tennis elbow and rotator cuff pathology

Efficacy of platelet-rich plasma as conservative treatment in orthopaedics: a systematic review and meta-analysis.
Franchini et al

36 RCTs: 11 Tennis, 14 PF, 4 AT, 3 RC, 2 PT, 2 other
Marginal improved pain scores at 6 months
Does not support use of PRP

TYPE OF PRP

The Effectiveness of Platelet-Rich Plasma in the Treatment of Tendinopathy: A Meta-analysis of Randomized Controlled Clinical Trials.
Fitzpatrick et al. Am J Sports Med. 2017 Jan;45(1):226-233

CONCLUSION
There is good evidence to support the use of a single injection of LR-PRP under ultrasound guidance in tendinopathy.

Category	LR-PRP	PRP	LR-PRP
Effectiveness	++	+	++
Quality	A	B	A

PRP: CONCLUSION

- Conflicting evidence
- Poor quality RCTs
- Researches are conducting systematic reviews: but concluding about bias and heterogeneity and quality of studies.
 - "garbage in garbage out"
- Specific tendinopathies
 - Tennis elbow: Best evidence. Better than steroid
 - PF: some promise – only 2 studies
 - AT: ?
 - PF: maybe
- Type
 - LR-PRP
 - Activated?

HIGH VOLUME INJECTIONS (HVI)

- Uses saline injection of 40-50ml
- Injected outside the tendon and strips tendon
- Strips the tendon from neo vessels, nerves and adhesions

HIGH VOLUME INJECTION

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HIGH VOLUME INJECTION

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HVI

Decreasing bias

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HIGH VOLUME INJECTION

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High volume injection with and without corticosteroid in chronic midportion achilles tendinopathy: RCT

Boesen et al. Scand J Med Sci Sports. 2019 Aug;29(8):1223-1231

28 Men (14 vs 14)

Results

- VISA-A and VAS score improved in both groups at all time-points
- VISA-A improvement was significantly greater in HVI with corticosteroid vs HVI without corticosteroid at 6 and 12 weeks but not at 24 weeks.
- Decrease in VAS scores was significantly greater in HVI with corticosteroid vs HVI without corticosteroid at 6 and 12 weeks but not at 24 weeks.
- Tendon thickness decreased significantly in both groups at all time-points ($P < 0.05$), but more in the HVI with corticosteroid vs HVI without corticosteroid at 6 and 12 weeks ($P < 0.05$) but not at 24 weeks.

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HIGH VOLUME INJECTION

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Effect of High-Volume Injection, Platelet-Rich Plasma, and Sham Treatment in Chronic Midportion Achilles Tendinopathy: A Randomized Double-Blinded Prospective Study.

Boesen et al. Am J Sports Med. 2017 Jul;45(6):2034-2043

A total of 60 men

- (1) one HVI (steroid, saline, and local anaesthetic)
- (2) four PRP injections each 14 days apart
- (3) placebo (a few drops of saline under the skin)

Conclusions:

Treatment with HVI OR PRP in combination with eccentric training more effective in reducing pain, improving activity levels, and reducing tendon thickness and intratendinous vascularity than eccentric training alone.

HVI may be more effective in improving outcomes of chronic AT than PRP in the short term.

HIGH-VOLUME INJECTIONS: PATELLAR TENDINOPATHY

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High-Volume Image-Guided Injection for Recalcitrant Patellar Tendinopathy in Athletes. Maffulli et al...

- Case series (n=44)
- Improvements in Visa-P, VAS and Functional VAS
- 72% returned to previous level of sport

HIGH VOLUME INJECTIONS (HVI)

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What does the evidence say?

- Few RCTs
- Initial promise
- Steroid vs no steroid- similar long term effect
- Well tolerated
- Mid portion AT- probably a role
- PT- ?

HYALURONIC ACID

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**HYALURONIC ACID: THEORY**

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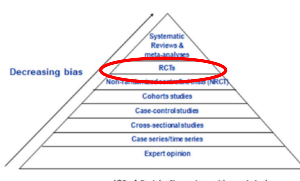
- The primary role of the HA in these tissues is to maintain their visco-elastic structural and functional characteristics.

Why in tendons?

- The lubricating characteristics of sodium hyaluronate increase tendon gliding and reduce agglutinations
- sodium hyaluronate blocks pain receptors, hinders inflammatory mediators
- Good transport medium for nutrients.

HYALURONIC ACID: WHAT DOES THE EVIDENCE SAY?

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HYALURONIC ACID

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Comparison of Peritendinous Hyaluronan Injections Versus Extracorporeal Shock Wave Therapy in the Treatment of Painful Achilles' Tendinopathy: RCT

Lynen et al. Arch Phys Med Rehabil. 2017 Jan;98(1):64-71

N=62, Mid portion

Two peritendinous HA injections showed greater treatment success in Achilles' midportion tendinopathy compared with standard ESWT.

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Efficacy and Tolerability of Peritendinous Hyaluronic Acid in Patients with Supraspinatus Tendinopathy: a Multicenter, Randomized, Controlled Trial.

Flores et al. Sports Med Open. 2017 Dec;3(1):22.

N=84

Ostenil Tendon

2x Subacromial HA injections combined with physical therapy have high efficacy in the treatment of supraspinatus tendinopathy, leading to an earlier return to pre-injury activity and the need for fewer rehabilitation sessions.

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HYALURONIC ACID

Management of Tennis Elbow with sodium hyaluronate periarticular injections

Petrella et al....

- RCT
- N=331
- 2x HA injections vs saline

Conclusion

- Significantly better than control in improving pain at rest and after maximal grip testing.
- HA treatment was highly satisfactory by patients and physicians
- Resulted in better return to pain free sport compared to control.

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HYALURONIC ACID: SUMMARY



What does the evidence say?

- Few RCTs- better quality
- Initial promise
- Well tolerated
- Mid portion AT- possible role
- Shoulder RC tendinopathy – possible role
- Tennis Elbow- good RCT to inform decision making. Probable role

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STERIOD

- Most injected drug to MSK system
- Strongly anti inflammatory
- Pain modulation

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STERIOD: EVIDENCE AND ITS ROLE

Coomes BK, Bisset L, Vicenzino B. Efficacy and safety of corticosteroid injections and other injections for management of tendinopathy: a systematic review of randomised controlled trials. *Lancet*. 2010 Nov 20;376(9754):1751-67.

Conclusion

Short term gains, long term worse in pure tendinopathy

BUT STILL A DEFINATE ROLE


- Pain management
- Breaking pain cycle
- Enabling pain free window for rehab
- Needing short term gain
- Bursitis

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SHOCKWAVE

Extracorporeal Shockwave Therapy (ESWT)

- Kidney stones (initially)
- Now MSK system
- Plantar fasciitis, shoulder tendinopathy, elbow tendinopathy, patellar tendinopathy and Achilles tendinopathy, hamstring origin, lateral hip



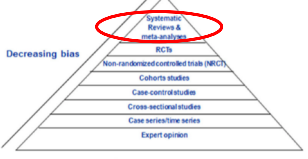
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EXTRACORPOREAL SHOCKWAVE THERAPY (ESWT): THEORY

- Shock waves are high energy sound waves
- Used to induce neovascularisation at the junction of the tendon-bone
- Lead to the improvement of the blood supply and to an increase in cell proliferation
- Tissue regeneration of tendons

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ESWT: EVIDENCE



EPBMed for Johns Eisenhower with normalization

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ESWT

Efficacy of Extracorporeal Shock Wave Therapy for Lower-Limb Tendinopathy: A Meta-analysis of Randomized Controlled Trials.

Liao CD, et al. *Am J Phys Med Rehabil*. 2018.

CONCLUSIONS

Extracorporeal shock wave therapy exerted a positive overall effect on pain and function for lower-limb tendinopathy.

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ESWT: EVIDENCE

The Effectiveness of Extracorporeal Shock Wave Therapy in Lower Limb Tendinopathy

A Systematic Review

Sethu Mani-Babu,¹ MBBS, Dylan Morrissey,¹ PhD, Charlotte Waugh,¹ PhD, Hazel Screen,¹ PhD, and Christian Barton,¹ PhD
Investigation performed at Queen Mary University of London, London, UK

Extracorporeal shock wave therapy is an effective intervention and should be considered for GTPS, PT, and AT particularly when other nonoperative treatments have failed.

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ESWT

The effectiveness of extracorporeal shockwave therapy in common lower limb conditions: a systematic review including identification of patient-rated pain reduction: Review article
Karakulak V, et al. Br J Sports Med. 2018.

Patellar tendinopathy
No difference between ESWT and placebo ESWT at short and mid-term (moderate)
Is superior to control conservative treatment at long term (low)

Proximal hamstring tendinopathy
ESWT is superior to conservative treatment at short, mid and long term to RCT (moderate)

Achilles tendinopathy (mid portion)
Comparable to exercise training, but superior to rest-and-own policy at 4 months in mid-portion AT (low)

Achilles tendinopathy (insertion)
Is superior to exercise training at 4 months to insertion AT (low)

Greater trochanteric pain
Less effective than corticosteroid injection at short term, but ESWT produced superior results at mid and long term in GTPS (low)

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ESWT

Effect of extracorporeal shock wave for tennis elbow: A protocol for systematic review of randomized controlled trial.
Review article Tang HY, et al. Medicine (Baltimore). 2019.

Good evidence from RCTs

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SHOCKWAVE: SUMMARY

- Most convincing evidence as an interventions
- Good quality reviews emerging
- Safety excellent
- Non-invasive
- Specific areas
 - Achilles insertion- superior to eccentric
 - Achilles mid portion- equivalent to eccentric
 - Patellar tendon- good long term effects
 - Proximal hamstring tendon- superior effects at short, medium and long term
 - Greater trochanteric pain: Good long term
 - Tennis elbow: good evidence awaiting SR

CONCLUSION OF EVIDENCE OF INTERVENTIONS

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CONCLUSION OF EVIDENCE

- Evidence currently growing...
- ESWT best evidence base
- RCTs emerging, but difficult to draw definite conclusions
- Lot of heterogeneity, bias
- Safety: good in all modalities
- KEY is choosing the right treatment for right patient at the right time

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TENDINOPATHY

What is causing the pain/ what's the pathology?

- Tendon tear
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- Avulsion/traction acute/chronic

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CASES

To look at situations that certain interventions could be considered....

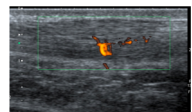
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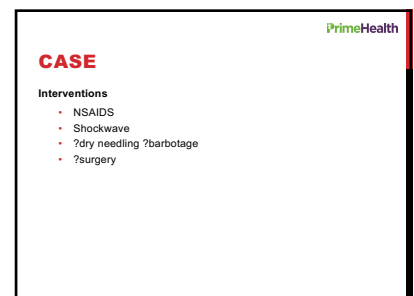
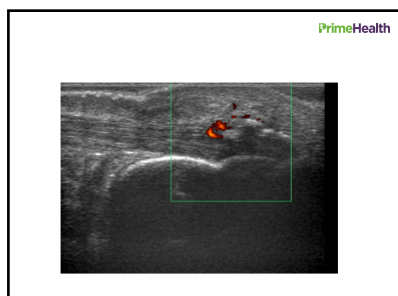
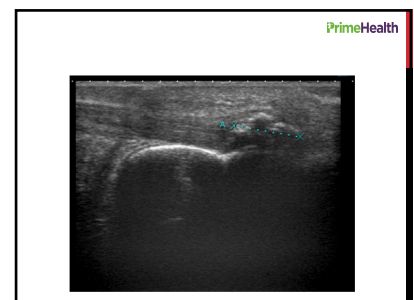
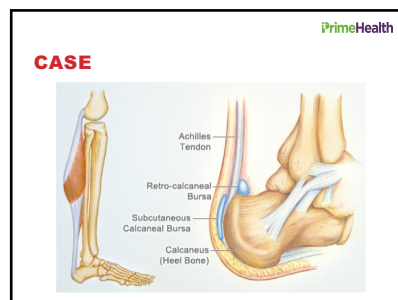
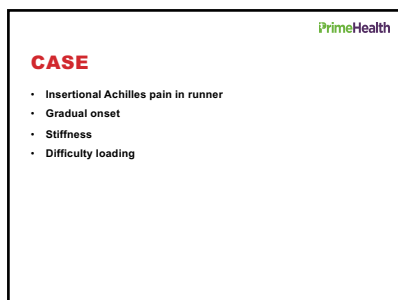
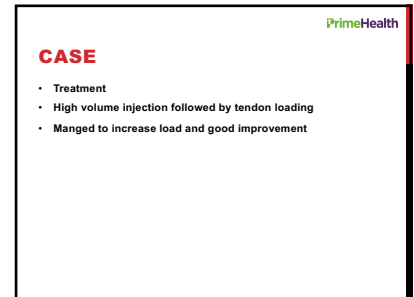
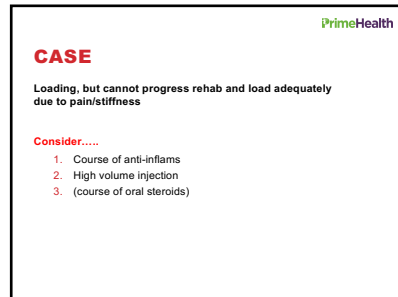
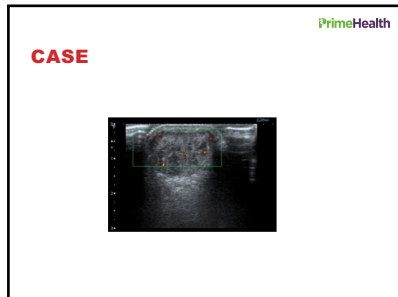
CASE

- 45 year old runner
- Achilles pain
- Worse with activity, stiff in morning
- Tender mid portion of Achilles, swollen

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CASE





CASE

- Insertional Achilles pain in runner
- Gradual onset
- Stiffness
- Difficulty loading



Tendon normal
Steroid

CASE

Footballer
History of Achilles tendinopathy
Well controlled
Jumped and landed: sudden onset of pain in achilles mid portion. Carried on. But pain afterwards

US: likely small Achilles tendon split on back ground of AT

Interventions....
?PRP – fibrosis? sticking?

CASE

Cricketer, fall on to elbow.
Triceps tendon pain since, struggling
Point tender +++

CASE



TREATED WITH...

Shockwave- pain worse
Loading no effect at all

CASE



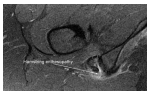
CASE

Diagnosis
Fractured enthesophyte
Fracture type of pain

?inject
?surgically remove

CASE

- 28 year old runner
- Painful buttock
- Point tenderness at hamstring origin over ischium
- Pain on hamstring stressing
- Diagnosis: proximal hamstring origin tendinopathy
- Not settling with rehab

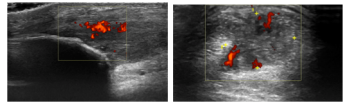


- Tricky!
- Shockwave

CASE

Patellar tendinopathy, rugby player
Improving symptoms but slow

Intervention consideration: Shock wave ?PRP ?HVI



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CASE

Builder
Lateral elbow pain- tennis elbow
GP injected steroid 5 years ago- relief until now
GP refusing to do it now as evidence changed
Loading no benefit- does rehab
Shockwave no benefit
Very keen on further steroid, understands risks
Treatment - ?

Had steroid. Good effect. No relapse after 1 year

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**INTERVENTIONS TO TREAT
TENDINOPATHY - AN EVIDENCE
BASED APPROACH!!**

- Evidence base growing
- Use it with sensible clinical correlation
 - History may give a clue, examination findings
 - Individualise treatment
 - Listen to what is required outcome ?reduce pain ?treat acute injury
- Multiple pathology can and do exist

CONTACT...

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